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A CASE OF PORENCEPHALY.

BY

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A CASE OF PORENCEPHALY.

By ALEC FRASER, Professor of Anatomy, Royal College of Surgeons in Ireland.

Anatomical.

The brain, which has been the subject of this study, was given to me by my friend Dr. Norman some five years ago.

It was a great favour to me, as during the last ten years all the spare time at my disposal has been occupied in tracing the developmental history and adult structure of the central nervous system, the most wonderful, the most difficult, and the most attractive of all the systems. I felt the more pleased with this specimen because, so far as I know, no case of an exactly similar character has been described in English literature, and also because the specimen proved itself to be one of the most perfect examples of the true porencephalic condition on record.

The little that was known of the individual from whom it was taken lends also an additional interest. He had, presumably, lived the greater part of his life under the ordinary conditions of existence, although latterly it became necessary to place him under restraint, yet he could use the affected leg for purposes of progression without artificial aid of any kind, also the affected arm in various ways, showing the great compensatory power which nature possesses in the complete absence of the important portions of the nervous system, which it is the purpose of this paper to describe.

The brain had been hardened in Müller's fluid, somewhat over-hardened, and was in the condition represented in the majority of the plates. I did not obtain the spinal cord. I photographed the specimen, natural size—first, its various external aspects, then the several dissections which were found necessary to lay bare everything that can be learned from a simple macroscopic examination, and finally I cut what had been left (Plate IV., Fig. 1) in the transverse vertical direction, and serially from the caudal end of the medulla up through the pons, mid-brain, thalamic brain, to the cephalic end of the striate portion of the hemisphere brain,

after the manner illustrated in Plate V. and in two of the Figs. in Plate VI.

The remarks which are to follow will refer almost solely to the naked eye conditions of this most interesting experiment on the part of nature.

I. *Description of the Encephalon.*—The illustrations for this have been so arranged that a careful examination of them will reveal, to the reader, the defects and alterations which have taken place in the organ far better, in my opinion, than any description of mine, and this would be all the more true could I have reproduced the negatives in my possession in a manner that would do them justice.

1. *Membranous Sac.*—As I was not present at the post-mortem examination I cannot speak with certainty as to the formation of it, but Dr. Norman's description, and a glance at Plate II., Fig. 1, and Plate I., Fig. 1, will place readers in the same position to judge as myself. In these Figs. its cephalic, dorsal, and caudal boundaries of attachment to the cranial dura are well seen. Ventrally it is attached to the tentorium. Its cavity communicates freely with the lateral ventricles here forming one large cavity, and with the ventral sub-arachnoid spaces. Whether its walls are formed by altered pia-arachnoid plus the remains of the affected hemisphere wall, as Schattenberg claims, or whether the pia is excluded, as Kundrat would have us believe, is a point I could not determine; at any rate, bands of the membrane can be observed passing across the porencephalic aperture (Plate II., Fig. 1), drawing the caudal extremity towards the cephalic one, forming a sort of valve for the caudal portion of the aperture, thus altering the relations, as regards size, of the membranous and the real porencephalic aperture (Plate II., Fig 2). The boundary limits between the membrane forming the walls of the sac and the thickened ependyma lining of the ventricular cavity are seen in Plate IV., Figs. 2 and 3. I shall refer to these more minutely further on.

Through this aperture the cerebro-spinal fluid passed freely into the ventral sub-arachnoid spaces, it bearing the same relation to these as the foramen of Majendie does to the large space situated dorsally to the caudal portions of the cerebellum and medulla.

2. *Lateral View* (Plate II., Fig. 2).—The true extent of the porencephalic aperture is seen here after removal of the membrane. It is situated in the region of the insula and the fissure of Sylvius, a large portion of the lobes entering

into the formation of the boundaries of the fissure, viz., portions of the orbital and third inferior frontal, the ventral third of the two central, a great portion of the supra-marginal, the whole of the first and retro-insular convolutions, as well as a great portion of the second temporal, more especially its cephalic end, have disappeared.

The ventral half of the posterior central and what is left of the supra-marginal area are in a microgyrous condition. The sulci of the frontal, posterior portion of the parietal, the occipital, and what remains of the temporal lobe are arranged radially round the margins of the aperture. The orbito-frontal and fronto-parietal false opercula limit the aperture cephalad and dorsally; a false operculum is also formed by the posterior third of the remains of the temporal lobe which limits the aperture ventrally. The line seen on the anterior two-thirds of this lobe marks the junction of the ventricular ependyma with both the cortical grey and the membranous wall of the sac, it runs in the Fig. on to a portion of the membranous wall, left behind in the dissection. Internal to this line is seen the outline of the hippocampus major shining through its thin medullary roof, formed by what remains of the temporal portion of the corona-radiata. The entire central lobe, except its ventral portion, where it is continuous with the anterior perforated space, has also disappeared, and corresponding to this the masses of grey matter forming part of the corpus striatum are much diminished. These masses, four in number, the caudate and lenticular nuclei, the claustrum and the amygdaloid nucleus, although they are separated for descriptive purposes, form one grey mass which is divided into the above-named constituents by white fibres passing through it, the four of them meeting at and being continuous with the grey of the anterior perforated space. The remains of these and the insula can be seen on this view lying between the cephalad end of the temporal lobe and the false orbito-frontal operculum.

For convenience, instead of passing to the ventral view, I shall deal next with the

3. *Ventricular View* (Plate IV., Figs. 2 and 3).—This view was made by passing the knife in at the porencephalic aperture to the dorsal surface of the caudate part of the healthy corpus striatum, passing the knife through, at this level, the junction formed by the meeting of the coronal with the callosal fibres, then horizontally cephalad through the genu of the callosum and through the frontal lobes, then horizontally also in the caudal direction, through the splenial

end of the callosum and through the occipital lobes, thus laying bare the entire ventricular cavity, except its so-called descending horn.

The first thing that strikes the observer is the complete absence of the septum pellucidum, due in this instance, without doubt, to the free passage of the cerebro-spinal fluid through the aperture to the ventral sub-arachnoid spaces. However, it is no unfrequent occurrence for the septum to be absent in the normal developing brain (see my diagrams of the foetal human brain in Vol. xii. of the "Trans. Roy. Acad. of Med. in Ireland"), and perforations in it are of frequent occurrence in the adult brain, thus throwing the adjacent ventricles into free communication otherwise than by the foramina of Munro. The next striking matter is the little if any change in the corpus callosum, except, perhaps, at its splenial extremity, a fact of significant meaning in the absence of so much of the true cortex. The amount of coronal fibres absent can also be judged of by comparing the healthy with the affected side. On the latter the frontal extremity of the corona is very evident, sweeping into its corresponding lobe, while the thinned out temporal extremity is seen arching over the so-called descending horn (in reality ascending). The early presence of the intervening parietal and occipital divisions of the corona is made evident by the position of the two atrophied bands of fibres, seen in Fig. 2 at their place of exit from the striatum, and in Fig. 3 at their place of entrance into the affected hemisphere.

The amount of striatum and insula present can also be better judged of than from the lateral view. The body and pillars of the fornix are considerably diminished on the affected side, and corresponding there was a similar diminution in the hippocampus major, as compared with that of the healthy one. The line of junction between the thickened ependyma of the ventricular cavity on the one hand and the membranous wall of the sac and cortical grey on the other can be followed on both Figs.

The other parts to be seen on the floor of the ventricular cavity, the caudate nucleus, the anterior part of the healthy thalamus, and the similar atrophied portion of the adjacent one, the choroid plexuses, the posterior and descending (ascending) horns can all be noted.

4. *Ventral View* (Plate I., Figs. 1 and 2).—From this view, on comparing the affected with the healthy side, can be judged the diminution mainly in the third inferior frontal

portion of the orbital surface of the frontal lobe, in the cephalic end of the temporal, and the caudal extremity of the occipital.

The most striking feature in the view is the twisting of the crura, the pons, the cerebellum, and the medulla to the affected side, due mainly to the absence of the pyramidal tract, also the amount of waste in the insula can be seen in Fig. 2, where the insula of the healthy side has been laid bare for comparison, by the removal of the orbito-frontal operculum.

The central olfactory apparatus, bulb, peduncle, tuber, and so-called roots are normal on both sides.

The optic tract of the affected side is reduced to a mere thread. At the origin of this tract from the commissure a well-marked division runs towards the tuber cinereum. The optic nerve on the healthy side is much reduced in size. The mamillary body of the affected side is drawn caudalwards. The cranial nerves from the third to the twelfth on the affected side were larger than my ordinary experience of them, the third was absent on the healthy side, but it must have been removed by accident before I received the brain, as its nucleus was present, but whether diminished or not I cannot state, in the absence of microscopic examination.

In regard to the cerebellum there was little marked difference between the hemispheres of the two sides, nor in the vermiform processes; if anything, the hemisphere opposite to the porencephalic side was the smaller of the two.

This slight alteration may be correlated with the fact of the presence of the frontal and temporal ends of the coronaradiata. The crus is very much reduced, and the anterior pyramid is absent from the medulla.

5. *Dorsal View* (Plate III., Fig. 2).—The amount of loss in the various lobes (frontal, parietal, occipital, and in part temporal) can be seen from this view at a glance, on comparing these lobes with those of the healthy hemisphere, and, as I have marked the sulcus of Rolando and the parieto-occipital fissure, no difficulty can be experienced in locating the several divisions of these lobes.

The first and second frontal, the upper portions of the two central, and the superior parietal can be observed.

The micro-gyrous condition of the posterior central and the supra-marginal area has been already noted. The various convolutions of the occipital lobe are present, although the lobe generally is much reduced in size in comparison with the healthy one. There was nothing unusual

to be noted on the median surface of the hemisphere brain down as far as the dorsal surface of the corpus callosum.

6. *Lateral View of Healthy Hemisphere*, Fig. 1 of the same Plate, represents this aspect of the hemisphere; Fig. 2 the dorsal one.

I have marked in the leading divisions of the hemisphere in the two Figs., so that little difficulty will be found in recognizing the various main gyri and sulci. The great complexity of those of a secondary and tertiary character on the cortical surface generally will afford an opportunity for the exercise of learned ingenuity in the bestowal of names. This complexity may with safety be stated as compensatory in character.

7. *Dorsal View of Striate Part of Hemisphere Brain and other Divisions of the Encephalon* (Plate IV., Fig. 1).—The most striking feature in the view is the great atrophy which the various divisions of the thalamus on the affected side have undergone. The pulvinar has completely disappeared. The reader can also judge of the great deficiency in the corona-radiata of the affected side. The dissection of the corresponding healthy region shows the normal thickness of the mass of fibres forming the corona, and which pass between the cortex of the insula externally and the grey of the nucleus caudatus internally.

The pineal gland and the ganglia habenulæ were unaffected.

The geniculate bodies of the affected side had disappeared, median as well as lateral.

The anterior and posterior tubercles of the mid-brain on the affected side had suffered in a slight degree, but the former more than the latter; their brachia also in a corresponding manner. The fourth pair of nerves are well seen in the Fig. The dorsal half of the cerebellum from the level of the great horizontal fissure had been removed, thus laying bare the middle and superior peduncles with the lingula on the dorsal surface of the velum.

I have thus far described the external anatomy of the encephalon, noting most of the departures from the ordinary conditions, and now I turn briefly to what can be learned from such simple

8. *Sectional Anatomy*, as is illustrated in Plate V. and in Figs. 1 and 2 of Plate VI. The first Plate represents a nearly continuous series of sections of the medulla, from its caudal to its cephalad end. There were twenty sections on the negative, of which the Plate is a reproduction; but a

number of the sections had to be excluded owing to exigencies in regard to the size of Plate suitable for the Journal.

In the sections the most striking feature is the almost complete absence of the pyramidal tract on the affected side—in fact this is the only great structural change to be seen, and in consequence of it a curved condition of the raphe. The inner and outer arciform fibres, the interolivary layer, the sensory crossing, the various masses of grey matter peculiar to the bulb, such as the inferior and accessory olives, the nucleus gracilis, nucleus cuneatus, and Rolandic area of grey matter, all are to be clearly seen, and those of the affected side differ little, if at all, from those of the healthy one.

In Figs. 1 and 2 of Plate VI. their peculiarities depend to a great extent upon the absence of the pyramidal tract. Although in the section through the mid-brain (Fig 2) the tegmental area of the affected side is appreciably diminished, in all probability it is that portion of its constituents known as the fillet that has suffered; the slight diminution in the grey matter of the testes and in its superficial and deep layer of fibres is also to be noted.

The reduction in the pedal system of fibres is far more extensive than can be accounted for by the absence only of the pyramidal tract; the whole of its constituents have suffered in a very marked manner, although portions of the frontal cortical, and temporo-cortical divisions of the corona-radiata were present in the hemisphere brain, as well as portions of the caudate and lenticular nuclei, from which sources the other main divisions (apart from the pyramidal tract) of the pedal system of fibres are said to have their origin.

II. *General Observations.*—The first matter that struck me personally in regard to this specimen was—in what manner did the large portion of the affected hemisphere, which was unquestionably healthy, lying adjacent to the longitudinal fissure, perform its functions? It contained a large portion of what is termed motor area (para-central lobule, the two central convolutions, etc.), yet this was cut off from its direct spinal or other connections by the absence of the great proportion of the coronal system of fibres.

Were the frontal and temporal ends of this system, much diminished as they were, sufficient to enable what remained of the hemisphere to live and act in a healthy manner through such long association bundles, as the cingulum, and superior longitudinal, or, as is more likely, did the callosal system, present, as it was, and not affected in a striking way, enable this portion of the hemisphere to live and function by

bringing it into relation with the coronal system of the opposite or healthy side, for it is unquestionable that the greater part of what is called motor area can live in the almost complete absence of the pyramidal tract.

I do not depend on this single specimen, valuable as it is, for this opinion, for in the winter succeeding the summer of 1889, in which I received this encephalon, I obtained two in the dissecting-room from subjects who were not idiots, nor had they ever been under restraint. One was from a very fine female, in which no external evidence could be detected of extensive brain disease (atrophy and contraction of the various segments of the limbs, etc.), yet, with the exception of the optic apparatus, the waste in the hemisphere and its basal parts, in the thalamus, crus, pons, and medulla, was very similar, there being, however, no ventricular communication, nor radial arrangement of sulci or gyri, nor were these latter in a micro-gyrous condition round the aperture, this being formed almost as if it had been cut with the knife out of an otherwise healthy hemisphere.

The other specimen was obtained from a subject who had been a soldier in his younger days, there being present, and very well marked, all the external evidence noted as being absent from the preceding.

The area of hemisphere waste was again almost similar, except that the temporal lobe was spared. The general surface of the affected hemisphere was not in such a good condition, however; the waste in the thalamus, pons, and medulla was also the same, except that in both of these dissecting-room cases the disappearance of the pyramid in the medulla was not so complete as in the true porencephalic one.

The evidence of these two, then, support the opinion stated, that the greater portion of the so-called motor area can live and function in the almost complete absence of the pyramidal tract, by the aid of either or both channels of communication mentioned.

The next matter of importance to be settled was what was actually implied by the use of the term porencephaly. Heschl, who introduced it, meant pits or depressions on the hemisphere surface, congenital in origin, that might or might not communicate with the ventricular cavity. Kundrat, whose Monograph is the most important on the subject, extended the application of the term to cases which could be acquired after birth, noting, however, the very different character of the sulci and gyri round the aperture

in those cases which had their origin during the development of the brain.

These distinctions are well exemplified in the case illustrated here, and in the two mentioned as being obtained in the dissecting-room.

Kundrat includes among his cases, however, those where developmental changes are so profound that in my judgment they ought to be relegated to hydrocephalic, microcephalic, or other pathological divisions.

A little consideration will show the difficulty in attaching a fixed meaning to a term that would be generally applicable, more especially in regard to the importance that might be imputed to ventricular communication, and to the effects that would follow the destruction or disappearance of particular portions of the hemisphere wall, as distinguished from that of other portions.

In the case described here the development was normal up to a stage when the opercula began to form, and the callosal fibres had appeared. (In human foetuses, having a head and trunk measurement of 12 to 13 c.m., head extended, not flexed on the thoracic wall, as it is in the ordinary intra-uterine position.) The area affected broke down from some pathological cause (vascular, inflammatory, etc., according to authors), was removed, and free communication established between the ventricular cavity or cavities and the ventral sub-arachnoid spaces.

In the adult female specimen found in the dissecting-room life had been presumably as usual until within four or five years of the date when she reached my hands, the same area broke down (in this case probably from emboli in certain branches of the middle cerebral artery), was removed, no ventricular communication was established, but there was only altered ependyma and pia preventing this; the formed sulci and gyri, could not arrange themselves in a radiate manner round the aperture, as did the soft and pliant portion of the hemisphere wall, which would give rise to them in the preceding case; the same degenerations, however, occurred, less complete, the optic apparatus not being involved in the adult case, but the effects generally on the subjects concerned, although occurring at nearly the extremes of life, must have been identical, yet the adult case, because it did not communicate with the ventricle, would by some be excluded from the definition.

Further, the various possible sites for a porencephalic

defect to exist on the hemisphere wall, or its basal portion, which would lead to the ventricular cavity, would have a very significant difference in meaning to the various subjects affected, all of whom might be described as porencephalic.

All connections of the cortex of every kind (excluding, perhaps, commissural, and associating) ; with all parts of the body, whether streaming up or down, all must pass by way of the coronal, or what is better called the projection system of fibres (except those having connection in an upward direction with the cortex of the central lobe or insula). I have given a Fig. 3 of Plate VI. of the normal lateral aspect of this system as it appears on its way to or from the mantle part of the hemisphere brain, so that the reader may see at a glance that any defect which destroys masses of fibres in this position must have a very different effect on the various systems or organs of the body (muscular, osseous, nutritive, special senses, etc.) from a defect which involves any other portion of the hemisphere wall. One can easily imagine apertures communicating with the ventricle, along the floor of the hippocampal, calcarine, or parieto-occipital fissures, or through even the dorsal or median half of the sulcus of Rolando, or through any portion of the dorsal surface of the callosum, yet defects in any of these positions could not affect the bodily organs in the same degree, as those in situations, where great groups of representative fibres are massed together, as they are along the corona.

Thus there would be porencephaly *and* porencephaly from the sufferer's point of view.

Again, should the term be applied (as has been done) in those cases where it occasionally accompanies other and more profound changes in the normal development of the hemisphere brain, and its basal parts, as well as in the other divisions of the encephalon, seen in internal hydrocephalus, micro-cephaly, and such like pathological conditions, changes, which for ever preclude the individual from taking any share in the responsibilities of ordinary life, and in which it is only one feature, and that a very subordinate one. Ahlfeld has classified the term as a subdivision of hydro-micro-cephaly ("Missbild. des Menschen," II. Abschnitt, s. 275), but in my judgment it should be restricted to those cases where it is the only defect in otherwise normally developed brains, whether the defect communicates with the ventricle or not, this being a small matter, if it involves

the entire thickness of the hemisphere wall, apart from the ependyma.

This would cover cases occurring at any period of life, intra or extra-uterine, as the results on the body systems generally are closely similar, though, perhaps, differing slightly in degree.

It is not for me to speak of the cause of such defects; they have been set down as due to arrest of development, extreme hydrocephalic conditions, emboli, and hæmorrhage, encephalitis, which may be specific, profound anæmia, and such like, all of which those interested can read of in the published cases.

III. *Literature*.—In Germany, as I have already stated, the monograph of Kundrat, “Die Porencephalie, eine Anatomische Studie,” Graz, 1882, is by far the most important that has been published. It deals with twenty-nine cases recorded before the date of his study, eight cases by Heschl, “Prager Viertel Jahrsschrift,” 1859 and 1868, six by Cruveilhier, cases by Deschamps, Hennoch, Abercrombie, Andral, Brechet, Meschede, v. St. Germain, Roger, Hügel, Brodowski, Huguenin, and Chiari. His own personal observations were twelve in number. He differentiated several forms of porencephaly, and made the distinctions already referred to. In a “Nachschrift” he refers to three cases by Prof. Klebs, published in the “Jahrbuch für Pädiatrik,” vii., Jahrg., 1876, under the title “Über Hydro- and Micro-anencephalie,” but could not agree with Klebs as to the cause, set down by him as due to local vascular obliteration.

The next most important contribution is the case described by Schattenberg, a pupil of Prof. Marchand, of Marburg, “Ueber einen Umfangreichen porencephalischen defect des Gehirns bei einem Erwachsenen,” with one Plate and 10 Figs. in the text, in the “Beiträge zur Path. Anat. und zur Allg. Path.,” v. Band, 1 Heft, Jena, 1889. This case was not unlike the one here described, only more of the frontal lobe was involved. The author considers his case to be one of true congenital porencephaly, as distinguished from the cases acquired in later life, included under the term by Kundrat; that the distinction was essential, not only because of the radial arrangement of the sulci and gyri, but also because of the structure and relation to the ependyma of the ventricular cavity of the membrane circumscribing the aperture; that the membrane contained as a constituent the remains of the hemisphere wall; that these several features could

not be seen in cases acquired after birth, where the wall of the defect was formed by the pia, the naked medullary substance of the brain, and altered ependyma.

He would thus exclude the cases described under the term which had their origin after birth, and could arise from various causes, from those exhibiting the characters described in his case (well-marked in the case recorded here), thus leaning more to Heschl's application of the term than to that of Kundrat.

He gives a summary of cases recorded after the date of publication of Kundrat's Study. Those of Rehm (*"Zeitschr. für Ration. Path.,"* Bd. ix., p. 220), von Tüngel (*"Klin. Mitteil. aus der Med. Abth. des Allg. Krankenhauses zu Hamburg,"* 1860, s. 65, and 1861, s. 79), Schüle (*"Allg. Zeitsch. für Psych.,"* Bd. 26, p. 300), Clarke (*"Journ. of Ment. Sci.,"* 1879), Budin (*"Ziemssen's Handbuch,"* 2 Aufl., Bd. 11, p. 907), Weber (*"Deut. Med. Wochenschrift,"* 1880, p. 283), Mierzejewsky (*"Archiv. de Neurologie,"* Vol. i., p. 353, 513), Binswanger (Virchow's *"Archiv.,"* Bd. 87, s. 427), Ross (*"Brain,"* 1883, p. 473), Sperling (Virchow's *"Archiv.,"* Bd. 91, s. 260), De la Croix (Virchow's *"Archiv.,"* Bd. 97, s. 307), L. Bianchi (*"Ref. in l'Encéphale,"* Vol. v., p. 113), Binswanger (Virchow's *"Archiv.,"* Bd. 102, s. 13), Lambl. (*"Archiv. für Psych.,"* Bd. 15, s. 45), Otto (*"Archiv. für Psych.,"* Bd. 16, s. 215), König (*"Allg. Zeitsch. für Psych.,"* Bd. 42, s. 138), Monakow (*"Archiv. für Psych.,"* Bd. 14, s. 734), Limbeck (*"Prager Zeitsch. f. Heilk.,"* Bd. 7, s. 97), Steinlechner-Gretschischnikoff (*"Archiv. für Psych.,"* Bd. 17, s. 649), Mingazzini und Ferraresi (*"Unters. z. Naturl. des Mens. und der Thiere,"* Moleschott, Bd. 14), Schultze (*"Beitrag zur Porenc.,"* Heidelberg, 1886), Birch-Hirschfeld (*"Lehr. des Path. Anat.,"* 3 Aufl., Bd. 2, s. 236), Jensen (*"Arch. für Psych.,"* Bd. 19, s. 269).

Also he notes cases which were extra-uterine, and possibly of traumatic origin. Herter (*"Inaug., Dissert.,"* Berlin, 1870), Heubner (*"Berliner Klin. Wochensch.,"* 1882, p. 737), Koerner (*"Berliner Klin. Wochensch.,"* 1885, Nos. 17 and 18), Petrina (*"Prager. Med. Wochensch.,"* 1886, Nos. 37-38), Witkowski (*"Archiv. f. Psych.,"* Bd. 14, s. 411).

Marchand, in a *"Nachtrag,"* adds to the above two cases by von Anton (*"Zeitsch. für Heilkunde,"* Prag., 1888, Bd. 9), also a case in his own possession of a newly-born child with congenital syphilis.

This contribution brings the record of cases in Germany down to 1889. Since then I have read cases recorded by—

(1) Moeli ("Archiv. für Psych.," Bd. 22), who deals with the atrophy in the optic apparatus (well-marked in the case recorded here). This atrophy is also dealt with by Monakow ("Archiv. für Psych.," Bds. 14, 16, 20, and 22), by Richter (Bd. 16 of the same), by Zacher (Bd. 22 of the same), and by Schmidt-Rimpler ("Archiv. für Augenheil," Bd. 19). (2) von Anton ("Über Angeborene Erkrankungen des Central-Nervensystem," Wien, 1890). (3) v. Monakow, a case communicated to the Med. Soc. of Zurich, recorded in the "Correspondenz Blatt für Schweizer Aerzte," 21 Jahrg., No. 6, 1891. (4) Kreuzer (Allg. Zeitschr. für Psych.," Bd. 48, 1892). In addition I have mislaid the references to two cases of which I saw a summary in "Virchow Hirsch," or similar German year book.

In France the subject has been dealt with purely from a literary point of view by Audry ("Les Porencephalies" in the "Revue de Médecine," June and July, 1888). He gives an analysis of 103 cases, including a number recorded by French observers, missed by the German authors (the cases noted in German literature amounting to a little over eighty in number). Of these 103 cases sixty-two had been expressly noted as having free ventricular communication.

He quotes from English literature, in addition to the cases of Abercrombie, Clarke, and Ross, noted by Kundrat and Schattenberg, one by Anderson ("Trans. Roy. Soc.," Edin., Vol. ii.), and another by Warner and Beach ("Brain," 1880). He discusses the pathological anatomy, the pathology, the clinical ætiology, the symptoms, the diagnosis, and the prognosis, all of which I must pass over.

IV.—*Explanation of the Plates.*—These form examples of the different methods of illustration at the service of the scientific worker.

Plates I., III., and VI. are lithographic ones made by myself. Plates II. and IV. are half-tone blocks made in Berlin from prints taken from my negatives. They are not good, and do not do justice in any way to the negative, but that may be more the fault of the print than the maker of the blocks.

Plate V. is a collotype made from a portion of my negative, which contained twenty sections instead of the number which appear on the Plate. Of course the sections which were made by the freehand, photographed by reflected light, and not differentiated in any way by staining (except what Müller's fluid can do) represent only the infancy of section cutting, and do not give a chance to this beautiful process of

reproduction, which cannot show more than what is in the negative, the latter representing the skill and mastery of both photographic, and morphological technique, of the particular worker, a matter very frequently overlooked. What the process can do for morphological anatomy can be better judged from my plates in Vol. xii. of the "Trans. of the Roy. Acad. of Med. in Ireland."

Plate I., Fig. 1, is the ventral view of the encephalon; natural size. Fig. 2 the same after the removal of the greater portion of the mantle or pallial part of the hemisphere brain.

Plate II. Both the figures are slightly reduced by the maker of the blocks. Fig. 1 is the lateral view of the encephalon, and showing this aspect of the membranous sac. Fig. 2 the same aspect after removal of the membrane.

Plate III., Fig. 1, shows the lateral aspect of the healthy half of the encephalon; natural size. Fig. 2 the dorsal view of the healthy and affected hemispheres.

Plate IV., Fig. 1 (natural size), shows the dissection that has been made to lay bare the dorsal aspect of the striate part of the hemisphere brain, and of the thalamic and mid-brain. The dorsal half of the cerebellum has been removed.

Figs. 2 and 3 show the dissection that has been made to lay bare the roof and nearly all the floor of the ventricular cavity of the hemisphere brain, the two ventricular cavities being thrown into one by the absence of the septum pellucidum. The figures are reduced in the proportion of 18 c.m. natural size (antero-posterior length of dissected hemisphere), to 11 c.m. reduced size.

Plate V. The negative contained twenty sections, but certain of these are excluded on the Plate for the reason already stated. Those at the caudal end of the medulla (below the inferior olive) show complete absence of the pyramidal tract, and the twist of the healthy pyramid to the affected side. The sensory crossing and all the other characteristics of the medulla have been noted in the text. In the sections at the cephalad end the pyramid has gathered a little on the affected side. The figures are nearly twice the natural size.

Plate VI., Fig. 1, represents a transverse vertical section through the pons cephalad to the exit of the fifth nerve. It shows the amount of waste in the pedal system of fibres on the affected side. The tegmental system has not suffered much apparently. Fig. 2 is a transverse vertical section through the mid-brain in the region of the posterior

tubercles of the corpora-quadrigemina. Even here the constituents of the tegmental system have not suffered in a marked degree.

The pedal system has, however, undergone enormous diminution, and that not alone in the pyramidal constituent, but in all of them. Both the figures are enlarged twice the natural size. Fig. 3 shows the lateral aspect (natural size) of the normal central lobe, or insula, and corona radiata. The thalamic and mid-brain, with the position of the pons and cerebellum, the olfactory and optic outgrowths from their respective regions are also shown. The line drawn through the corona, central lobe, and pulvinar, marks roughly the amount of these regions wanting in the encephalon, the peculiarities of which have been shortly touched upon in this paper.

I have to thank Dr. Norman for permission to use his clinical description of the case, and his account of the Autopsy.

N. P. was admitted to the Dublin District Asylum in February, 1886. Nothing was known of his antecedents, nor was there any history whatever save that he had been guilty of an unnatural offence, had been committed to prison, and had been found to be insane. He would or could give no information about himself.

When I first saw him (September, 1886) he seemed about his stated age, 42. He was of low stature, about 5ft. 6in. His face was small and of a somewhat negritto type, with low-bridged nose, wide nostrils, and rather prognathous mouth. Hair and skin extremely dark for a native of these climes, but his hair, which grew low down on a somewhat receding forehead, was straight and even. Little beard. No unusual development of hair on the trunk or extremities. He exhibited partial hemiplegia affecting the right arm and leg. These limbs were altogether smaller than the left, both bones and muscles. The tibialis anticus and the peronei were specially wasted and talipes equino-varus existed. The knee was slightly flexed and its range of movement was limited. Similarly with the hip-joint. The fingers of the right hand could not be fully extended, and the wrist was permanently flexed with very trifling range of movement. The elbow and shoulder joints were partially stiffened in the flexed and adducted posture, with small range of movement. The facial muscles were not paralyzed. The tongue was straight. General sensibility did not seem to be impaired on the affected side.

I regret to say that having on superficial examination formed the careless diagnosis of "infantile paralysis," I did not correct this opinion during the patient's life, and lost consequently a valuable opportunity of clinical observation. The condition of the special senses was not investigated. No symptom was observed, however, pointing to any lesion of special sensibility. No oculomotor abnor-

mality was observed. The voice was somewhat bleating in tone. The vocabulary was not in any way specially limited. The patient could read print.

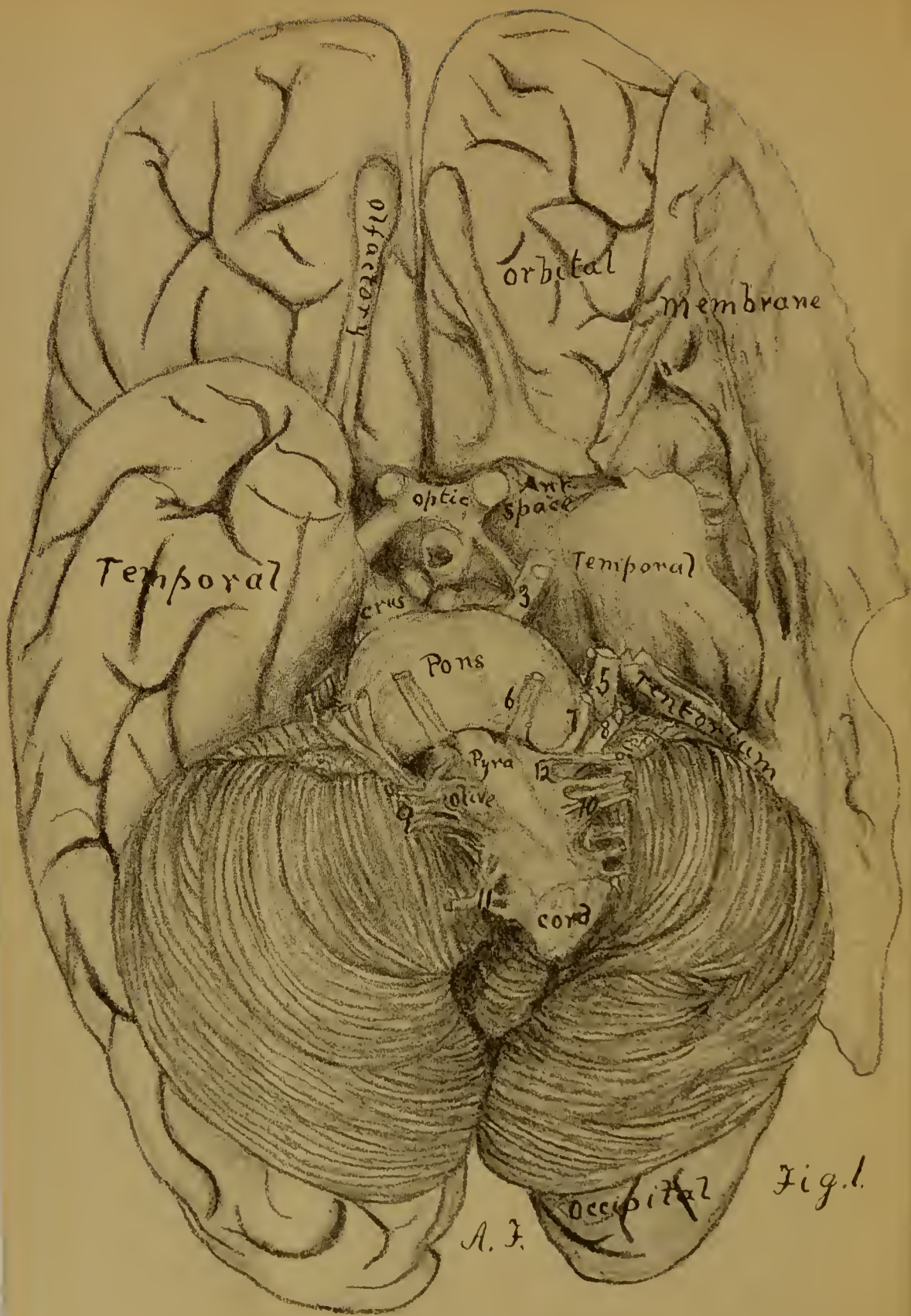
The general intelligence was low, but he was not an idiot. He entertained delusions of the paranoiae type, fixed persecutory delusions, chiefly to the effect that people in the gaol had put beasts in his inside to torture him; that his inside (chest) was full of gnawing beasts and so forth. He complained bitterly of this treatment, and said that the asylum authorities were conspiring with the prison warders to persecute him. No hallucinations were noted, unless the gnawing sensations were of this nature, but I think it is more probable that they were real feelings misinterpreted, which had their physical basis in the morbid processes of incipient phthisis.

The patient walked without a stick or other aid, and was able to feed himself with his right hand. I mention this to show, for want of more accurate data, how much voluntary power over the extremities remained. No particular change took place in his mental or nervous state. He lost flesh gradually, and was found to be suffering from consumption. To the last he appealed to his wasting and his pains as confirmation of his belief that there were beasts in his inside gnawing his vitals and destroying him. He died on May 22nd, 1889.

Autopsy.—It was unfortunately not possible to perform a *post-mortem* examination till nearly 30 hours after death. The body was emaciated. Both pleural cavities were obliterated by adhesions, and both lungs contained numerous cavities. Otherwise the thoracic and abdominal viscera were healthy.

The left parietal eminence was distinctly more prominent than the right. The contour of the skull presented no other abnormality. The calvarium, generally, was rather thick and dense, the diploe being in parts almost absent. Dura not abnormally adherent to the bone. On removing the calvarium the dura was unduly prominent in the left parietal region, and on palpation seemed to cover a large collection of fluid in this region. On puncture, sixteen ounces of perfectly clear fluid escaped. A large cavity was seen to exist in the situation of the sylvian fissure and insula. From the edges of this cavity, which was everywhere perfectly rounded, a stout membrane ran outwards, confluent for from an inch to two inches round the upper margin of the cavity with the pia mater, there parting company with the pia and running out in a loose fold to the dura, with which it became continuous. Posteriorly this membrane was continuous with the tentorium. Various strong bands of membrane ran across the large opening, one of which, lying antero-posteriorly, expanded at its posterior end so as to form a sort of loose, valve-like covering for the posterior part of the opening. The most convex portion of the rounded margin of the opening showed a small but distinct ridge, which seemed to mark the termination of the pia. Internally thereto the ventricular cavity presented the appearance of being lined with ependyma in the usual way.





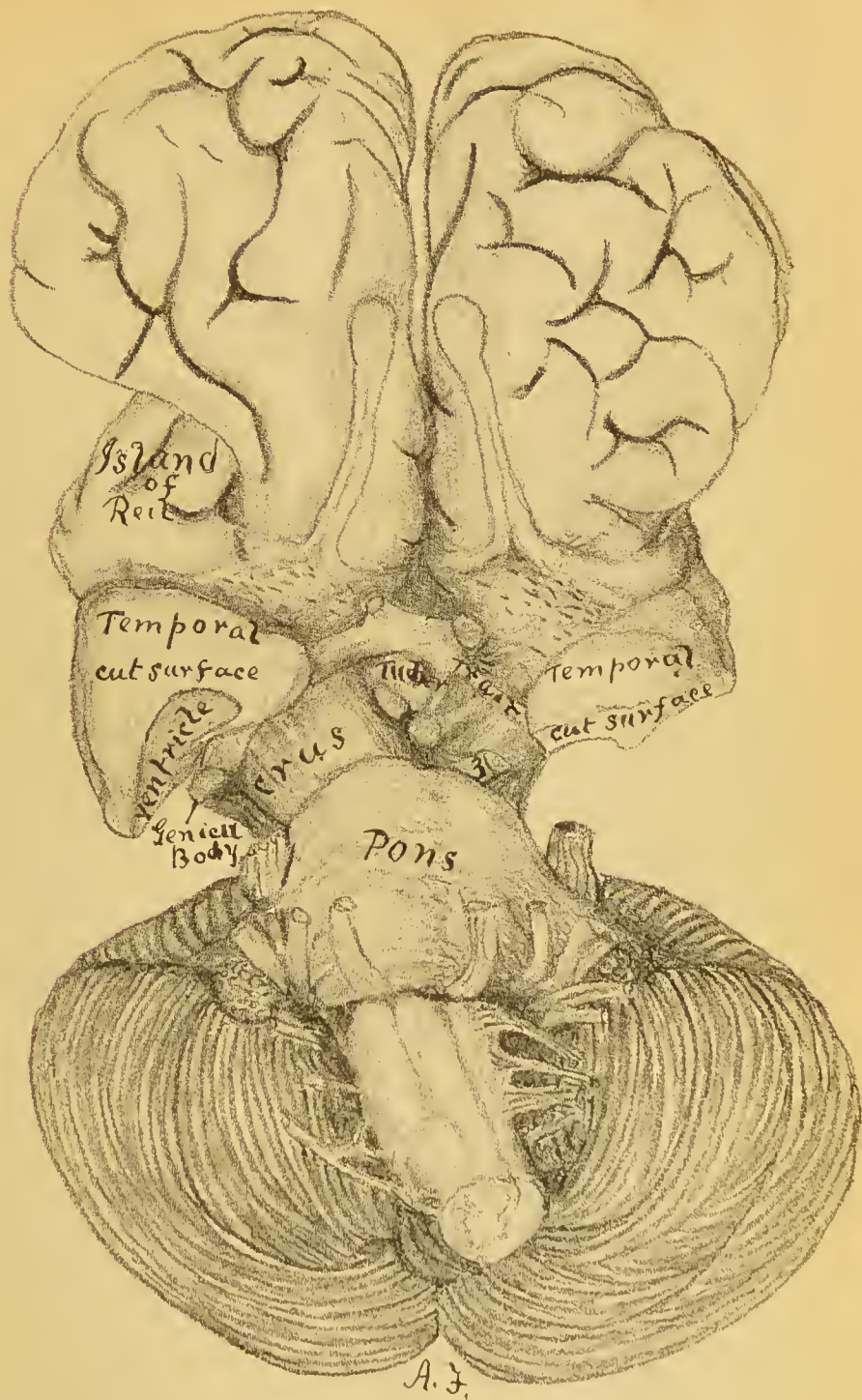


Fig 2



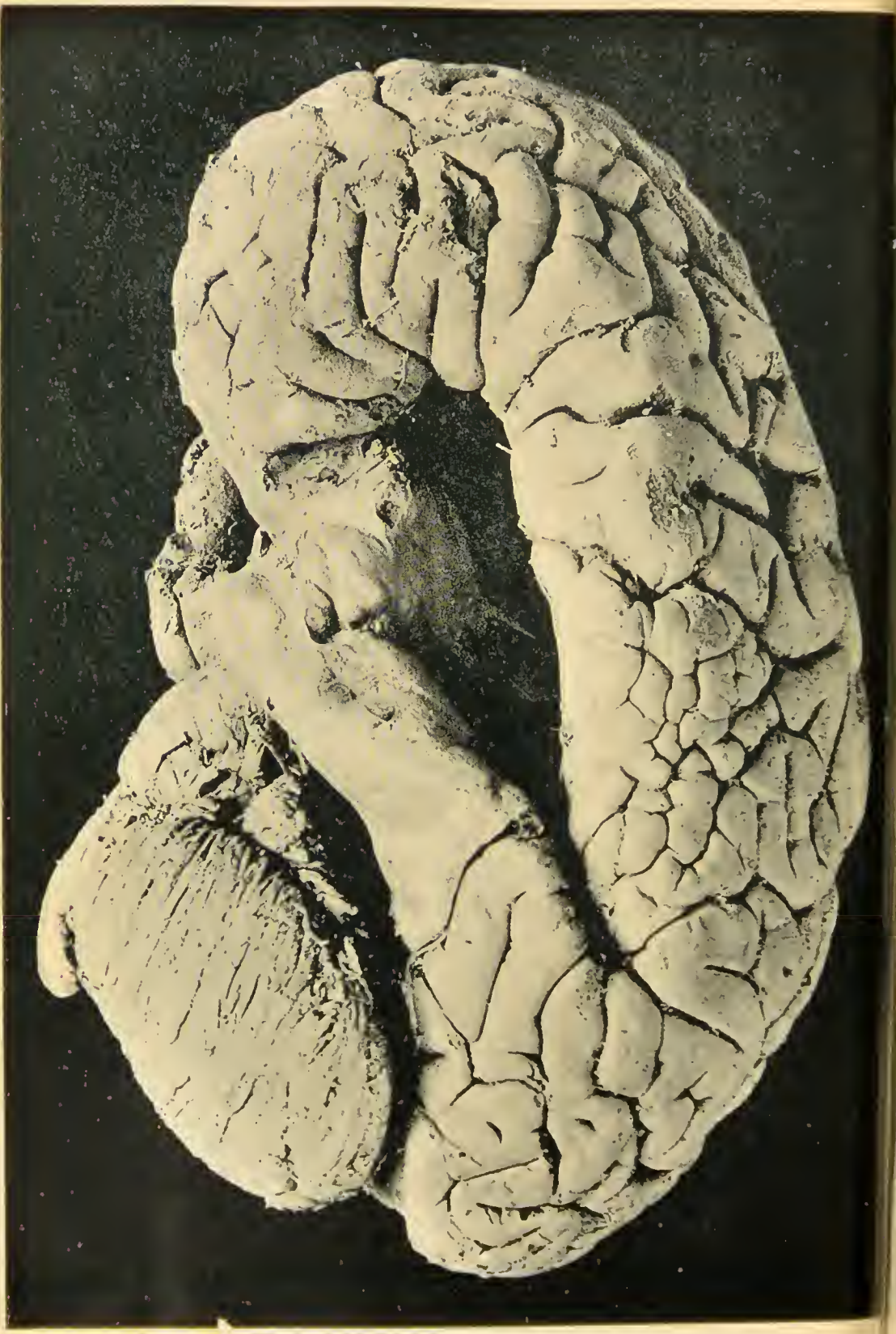
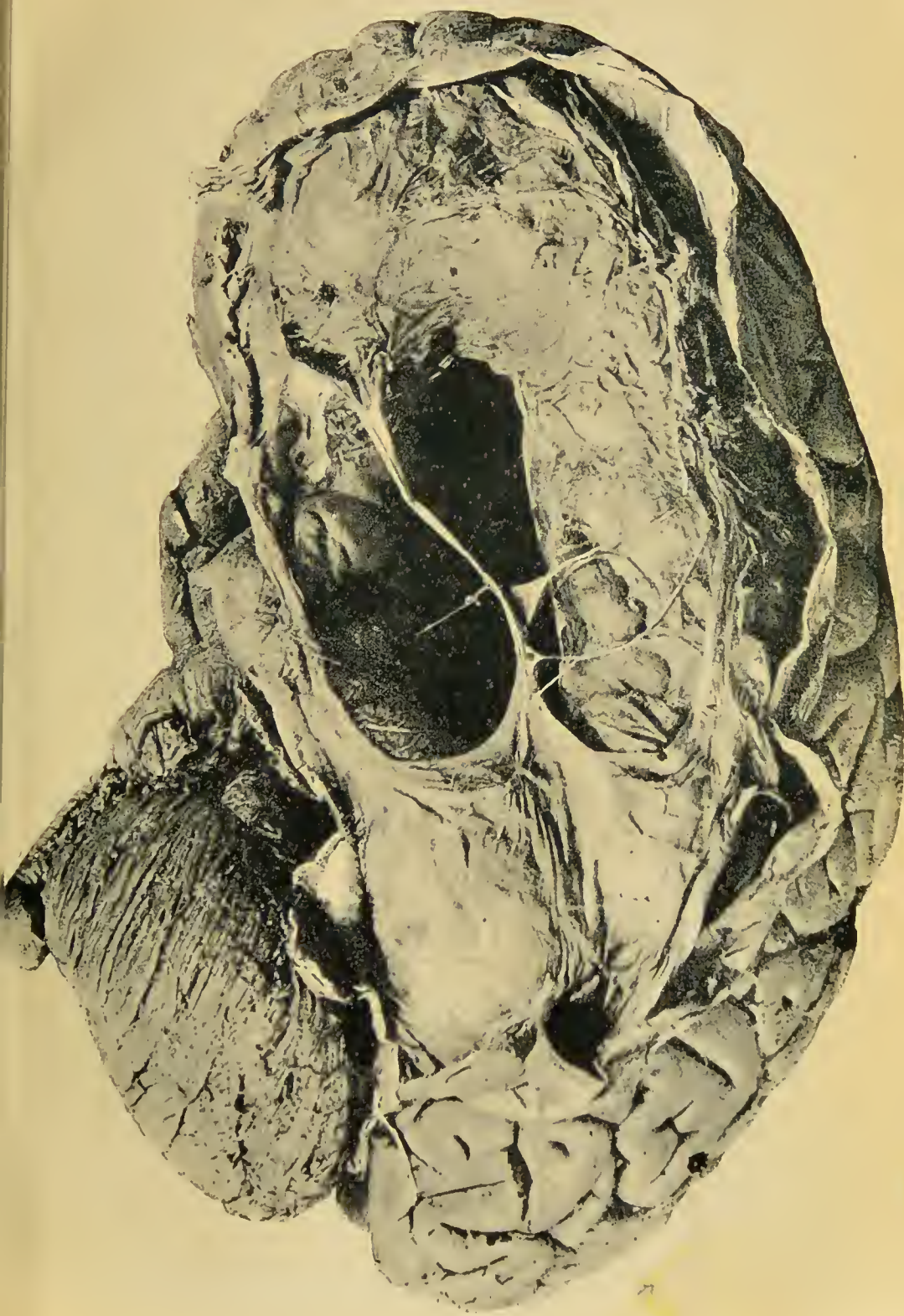


Fig. 2.





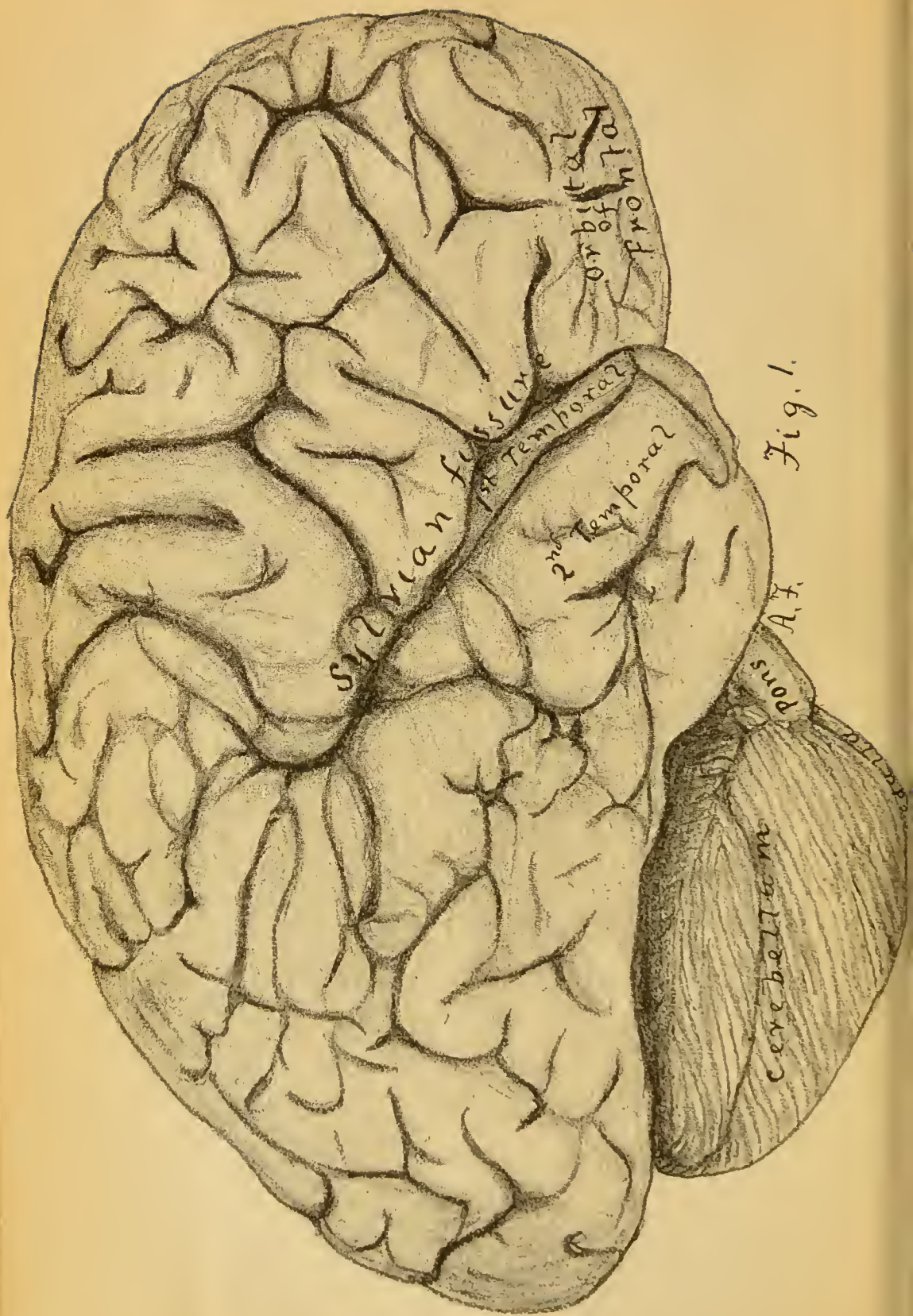


Fig. 1.

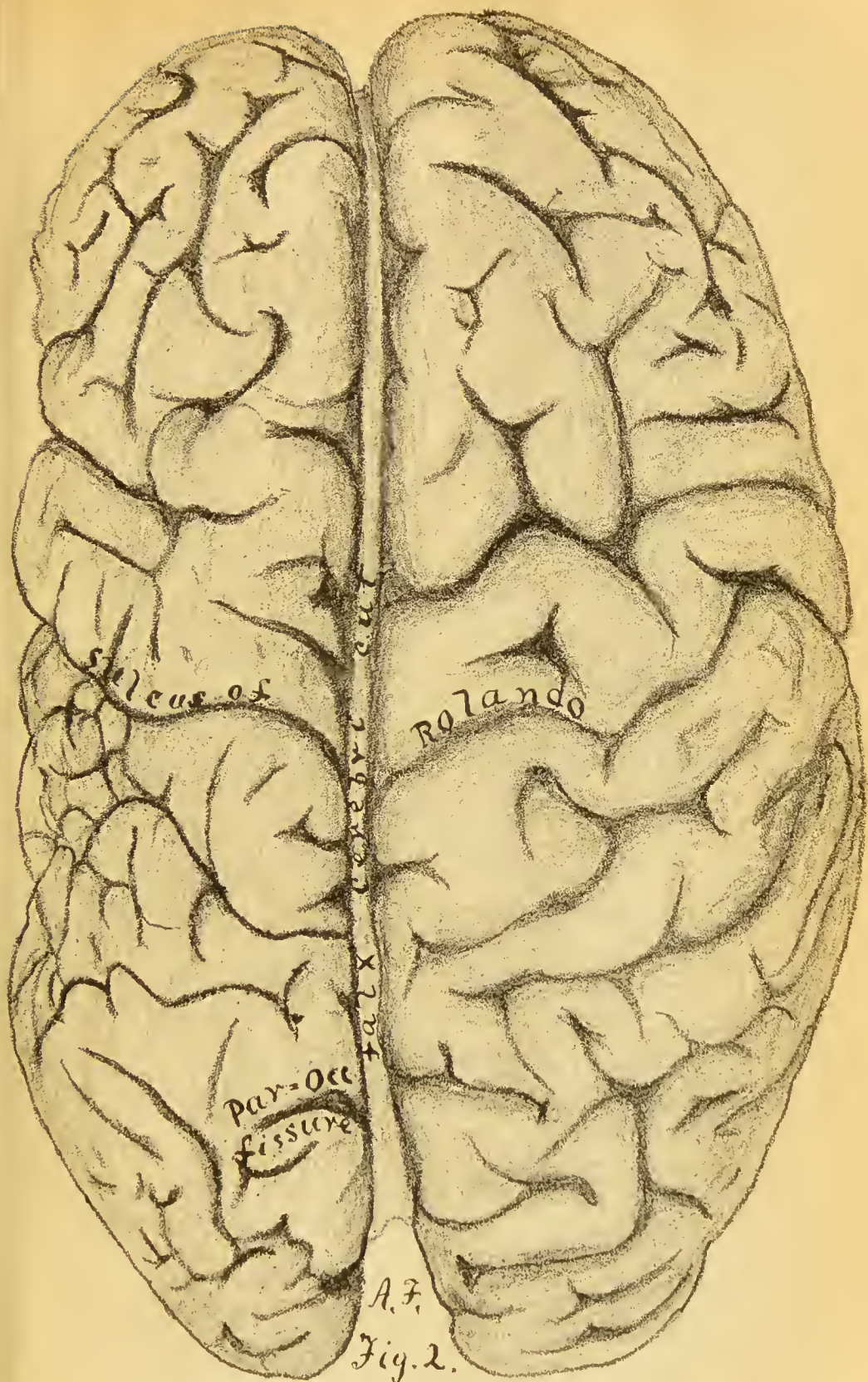




FIG. 2.



FIG. 3.





FIG 1.







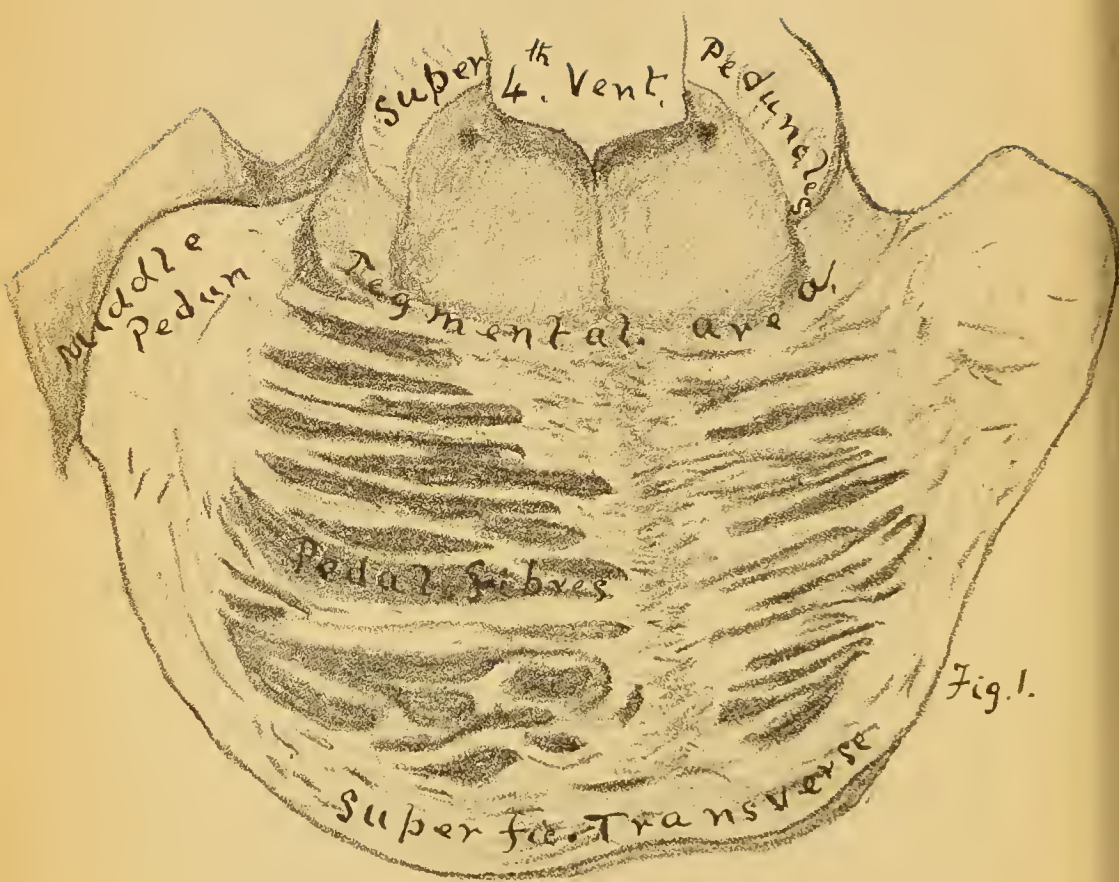


Fig. 1.

